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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/695,609	10/28/2003	Eiichi Iino	81839.0142	6295

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EXAMINER

SONG, MATTHEW J

ART UNIT PAPER NUMBER

1722

DATE MAILED: 04/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/695,609	<b>Applicant(s)</b> IINO ET AL.	
	<b>Examiner</b> Matthew J. Song	<b>Art Unit</b> 1722	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 August 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 10-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 10-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claim 11 is rejected under 35 U.S.C. 102(b) as being anticipated by Murai et al (US 5,501,172).

In a method of growing silicon single crystals, note entire reference, Murai et al teaches a seed tapered from a prism or cylinder (col 5, ln 60-67), this reads on applicant's seed crystal which does not have a straight body portion but has a body shape selected from the group consisting of a cone shape and a pyramid shape. Murai et al also discloses a seed crystal is dipped into a silicon melt and kept in the melt until thermal equilibrium is reached between the seed crystal and melt (col 4, ln 1-40)/, this reads on applicant's melting the tip end of the seed crystal. Murai et al also teaches forming a neck 5 (col 4, ln 1-35 and Fig 1).

3. Claims 13 is rejected under 35 U.S.C. 102(e) as being anticipated by Abe et al (US 5,911,822).

In a method of forming a silicon single crystal using the Czochralski method, note entire reference, Abe et al discloses the tip end of a seed crystal is formed into a conical shape or pyramidal shape in order to have a sharply pointed shape or a truncation thereof (col 8, ln 60-65), this reads on applicant's silicon seed crystal which does not have a straight body portion but has body shape selected from the group consisting of a cone shape and a pyramid shape. Abe et al also discloses growing a silicon monocrystal ingot having a desired diameter without necking (Abstract). Abe et al also discloses a tip end portion of the seed crystal is melted to have a desired size and the seed crystal is slowly pulled upwardly from the melt (col 10, ln 1-67). Abe et al also teaches a seed crystal cut from a large monocrystalline ingot (col 8, ln 10-25).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murai et al (US 5,501,172) as applied to claim 11 above, and further in view of Wolf et al (Silicon Processing in the VLSI Era, Vol 1: Process Technology, Lattice Press, Sunset Beach, CA, USA, pp 59-61, 1986).

Murai et al discloses all of the limitations of claim 10, as discussed previously, except Murai et al does not teach the claimed oxygen concentration of 12 ppma or less.

Wolf et al disclose processing and material parameters typical in Si. The typical oxygen concentration is 10-20 ppma (pg 59). Wolf et al also teaches oxygen has a beneficial strength effect (pg 61). Overlapping ranges are held to be obvious (MPEP 2144.05).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Murai et al by using a seed crystal having an oxygen concentration between 10-20 ppma, as taught by Wolf et al, to obtain a sufficiently strong seed crystal for pulling a single crystal silicon ingot.

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Abe et al (US 5,911,822) as applied to claim 11 above, and further in view of Wolf et al (Silicon Processing in the VLSI Era, Vol 1: Process Technology, Lattice Press, Sunset Beach, CA, USA, pp 59-61, 1986).

Abe et al discloses all of the limitations of claim 12, as discussed previously, except Abe et al does not teach the claimed oxygen concentration of 12 ppma or less.

Wolf et al disclose processing and material parameters typical in Si. The typical oxygen concentration is 10-20 ppma (pg 59). Wolf et al also teaches oxygen has a beneficial strength effect (pg 61). Overlapping ranges are held to be obvious (MPEP 2144.05).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Abe et al by using a seed crystal having an oxygen concentration between 10-20 ppma, as taught by Wolf et al, to obtain a sufficiently strong seed crystal for pulling a single crystal silicon ingot.

#### ***Response to Arguments***

7. Applicant's arguments filed 8/4/2005 have been fully considered but they are not persuasive.

Applicant's argument that Murai only teaches a seed crystal having a prism or cylinder shape (straight body portion) is noted but is not found persuasive. Murai et al clearly teaches a seed taper 3, which reads on applicant's seed crystal body consisting of a conical or pyramidal shape because the taper is from a prism or cylinder shape (col 5, ln 55-67). Although, the seed is narrowed to create the tapered seed portion during processing, the neck is formed from the seed tapered portion; therefore satisfies the claimed limitation of the seed crystal.

Applicant's argument that claim 11 is distinguishable over the prior art because claim 11 incorporates a limitation of U.S. 6,670,036, which is division of the instant application is noted but is not found persuasive. The prior art teaches the claimed limitation regarding oxygen concentration; therefore this argument is moot.

Applicant's argument that Abe et al teaches a straight body portion is noted but is not found persuasive. Although Abe et al does teach a straight body portion, Abe et al also teaches a

Art Unit: 1722

non-straight body portion, which is conical; therefore meets the limitation of a seed crystal which does not have a straight body portion.

Applicant's argument that Wolf et al teaches oxygen concentration for an ingot, not a seed crystal is noted but is not found persuasive. Seed crystals are obtained from cutting from a large monocrystalline ingot (Abe col 8, ln 10-25), such as the one taught by Wolf et al. Therefore, the oxygen concentration of the ingot determines the oxygen concentration of the seed crystal.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the presence of oxygen within silicon is useful in increasing strength of the silicon product.

### ***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

Art Unit: 1722

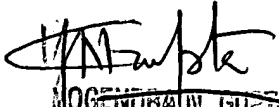
MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJS  
April 17, 2006

  
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Examiner  
Art Unit 1722